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TECHNOLOGY DEPARTMENT

SCIENCE NEWS LETTER

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Diamonds Amplify

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ELECTRONICS

Amplify Electric Current

By having an electron gun shoot a beam at a small diamond chip it is possible to produce electric currents several hundred times as large as the original.

See Front Cover

► AN electric current shot at a diamond chip has been amplified, or strengthened, as much as 500 times by a new method developed in the Bell Telephone Laboratories, the American Physical Society was told in New York by Dr. K. G. McKay of that research center.

He described the discovery as a radically new method of controlling the flow and amplification of an electric current, one that may have far-reaching influence on the future of electronics. It is not expected to replace existing electronic techniques but rather to supplement them.

The method is based on the discovery that when beams of electrons are shot at an insulator, in this case a diamond chip, electric currents are produced in the insulator which may be several hundred times as large as the current in the original electron beam. The apparatus is shown being inspected by Dr. McKay on the cover of this week's SCIENCE NEWS LETTER.

The diamond chips used are what are called saw-cuts, obtained from a natural diamond in shaping it for a gem. They are roughly the size of a small snow-

flake. Before they are used for this electrical process, they are coated with very thin films of gold, applied by the evaporation method, to afford electrical connections.

Methods of amplifying currents in gas or vacuum tubes have been known for 35 years, Dr. McKay stated. But this has never been done previously in solids. The process is somewhat similar, he said, to the technique of translating the energy of light into electricity by the well-known photo-electric cell.

The experiments reported by him stemmed directly from previous Bell Laboratory research in which current was induced in diamonds by bombarding them with alpha particles. These are relatively heavy, positively charged bits of matter shot off by radioactive substances. The findings were verified in other laboratories, particularly at the National Bureau of Standards. The development promises a new and improved laboratory tool for detecting and counting alpha particles. The National Bureau of Standards has already announced that diamonds might be used to replace the Geiger counter, the standard instrument to detect radioactivity discharges.

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GENERAL SCIENCE

New Drive for Foundation

This bill, which may finally assure federal support for science, will soon be introduced to Congress. Plan measure to overcome President's former objections.

► A THIRD drive to give the U. S. a long-delayed National Science Foundation is quietly under way. The bill which may finally bring civilian control to federal support of science is expected to be introduced soon.

The new measure is being planned to overcome the objections raised by President Truman when he killed, via pocket veto last August, a National Science Foundation Bill passed by the first session of the 80th Congress. Sen. H. Alexander Smith, R., N. J., leader of the group supporting the vetoed bill, will in-

duce the new version in the Senate, while Rep. Charles A. Wolverton, R., N. J., and chairman of the House Committee on Interstate and Foreign Commerce, may introduce the same bill simultaneously in the House.

One Science Foundation bill has already been referred to Rep. Wolverton's committee. This bill, which answers at least one of the President's veto objections, was introduced a few weeks ago by Rep. J. Percy Priest, D., Tenn., but it is not expected to get out of the committee.

The National Science Foundation is a bit of postwar business which has been accumulating an ironic history since the end of hostilities. Before the war ended, scientists and others recognized that federal support of science, which played a big role in victory, should be continued in peace. The wartime Office of Scientific Research and Development, it was generally agreed, would be succeeded by a National Science Foundation.

The first bill to establish the foundation passed the Senate in the 79th Congress, but did not get to the floor of the House. Last year's Science Foundation Act got to the White House before being killed. But everyone remains convinced that the foundation is necessary. No one has opposed it. The question has been and continues to be one of setting up an organization satisfactory to the President, Congress and scientists.

The Administration's budget for the coming fiscal year includes \$15,000,000 for the as-yet-unauthorized foundation.

"I hope that the Congress in this session will pass a bill for this purpose (National Science Foundation) in keeping with the principles of responsible and efficient administration," the Chief Executive declared in his budget message.

Support of scientists for the foundation is united in the Inter-Society Committee for a National Science Foundation, a unique organization representing scientific and educational organizations. Pres. Edmund E. Day of Cornell University is chairman of the group's executive committee. Vice-Chairman is Dr. Harlow Shapley, director of the Harvard College Observatory and past president of the American Association for the Advancement of Science, while Dr. Dael Wolfe of the American Psychological Association is secretary-treasurer and Washington representative.

The Inter-Society Committee is an impressive and unique lobby with the sole function of pressing for a National Science Foundation. They are hopeful that the fight for the foundation may be nearing an end.

If the new bill coming before Congress is brought to a vote, it is unlikely anyone will want to vote against science. And if this measure represents an improvement in the eyes of the Administration, it can become law.

Despite the Marshall Plan, inflation and taxes, the second session of the 80th Congress may be remembered in future years as the one which started the National Science Foundation.

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NUCLEAR PHYSICS

New Steps in Electricity

Germanium metal bombardment with a cyclotron has produced new types of electrical "semiconductors" which may be useful for radio, radar and microwave.

► BY knocking holes of positive electricity in the unusual metal germanium with an atom-smasher, Purdue University physicists have created a new kind of substance that promises to be useful in rectifying electricity and converting light into electrical effects.

Dr. K. Lark-Horovitz, head of Purdue's department of physics, told the American Physical Society meeting in New York that with the Purdue cyclotron new types of electrical "semiconductors" have been produced which promise to have varied applications in the field of radio, radar and microwave.

Very pure germanium metal was bombarded with the hearts of heavy hydrogen atoms, deuterons, accelerated to 10,000,000 volts. Although the attack was for only a few seconds, lasting changes were produced in the metal, and the resistance of the metal was increased ten-fold.

"Holes" which behave like electrons that are positive electricity instead of the usual sort of negative electricity are created by the bombardment and this leads to new phenomena which allow the use of the bombarded material as rectifiers, photosensitive devices, and for other possible uses.

The bombardment dislocates permanently atoms from their regular positions in the metal, Dr. Lark-Horovitz explained, and when these atoms are dislocated they are able to take up electrons from the internal structure of the metal and produce in this way some holes that for all practical purposes behave like positive electrons.

Half of a piece of the metal can be bombarded and made to conduct electricity by means of the positive holes and the other half can be left alone, conducting in the ordinary manner. This makes a rectifier that can yield direct current from alternating current. The sharp boundary between the positively and negatively conducting regions is extremely photosensitive and can be used to convert light into electricity, particularly in the invisible infrared regions of the spectrum.

Other nuclear particles are being tried in a similar way for their effects on

germanium and other substances. The hearts of helium atoms, called alpha particles, have already been found to produce strong effects, Dr. Lark-Horovitz reported. Drs. E. Bleuler, R. Davis, and D. Tendam were in the Purdue cyclotron group making the experiments.

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AERONAUTICS

Largest Ram-Jet Engine Ever Flown Passes Test

► THE largest ram-jet engine ever flown was successfully tested in Inyokern, Calif., the U. S. Navy revealed. Its speed was far in excess of the speed of sound. The "flying stovepipe" shot through the air like a rocket; it was not in a plane.

The ram-jet is not a primary source of power for an airplane, but a secondary power to give sudden spurts of speed to a plane already travelling at a fast clip. A speed of from some 300 to 400 miles an hour is required before the ram-jet scoops up enough air to cause combustion and set it into operation.

Something similar to the ram-jet is already in use in a few planes as an "afterburner" behind the jet engine to complete combustion of unconsumed combustibles in the jet exhaust.

The ram-jet engine was developed by the Applied Physics Laboratory of the Johns Hopkins University at Silver Spring, Md., during the war, and was designed especially as the propulsion unit for guided missiles which acquired initial speed by means of a rocket or a combination of rockets.

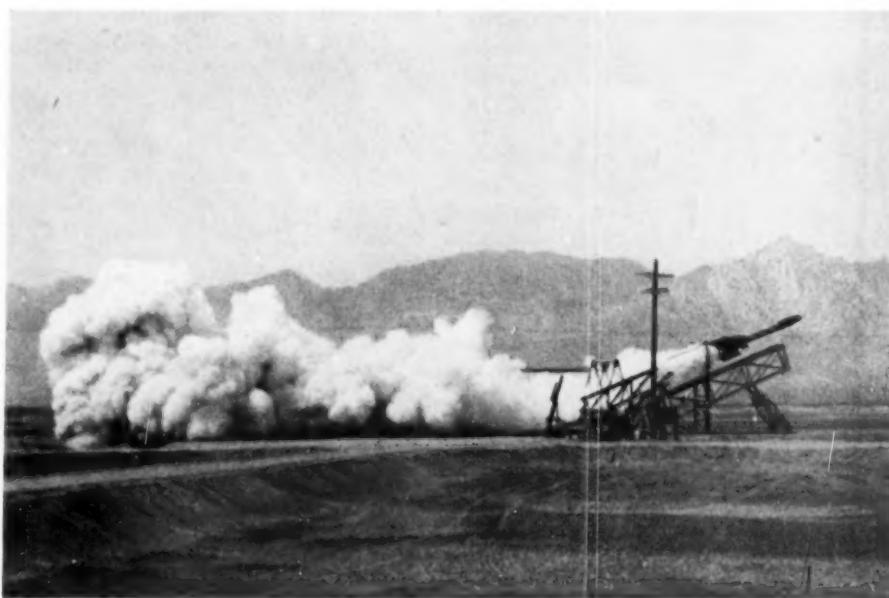
This type of engine has no moving parts. It is a metal tube open at both ends which scoops up air at high speed to cause the combustion of a fuel within, giving a high-speed discharge of gases at the rear, thus causing propulsion in the same manner as the ordinary jet engine. However, it is a powerful device. Pound for pound of engine weight, the large ram-jet just tested delivers about 25 times the power available from the best aircraft reciprocating engine.

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AERONAUTICS

Plane and Missile Bodies Must Be Slim and Pointed

► AIRCRAFT bodies, both of planes and missiles, must be slender with long pointed noses, and with all body angles as small as possible, if they are to be used at extremely high altitudes, the Institute



SUCCESSFUL FLIGHT TRIAL—This shows the largest supersonic ram-jet engine ever flown leaving the launching rack. The ram-jet must first be boosted to high speed by a rocket, which then drops off, leaving it to continue under its own power.

of the Aeronautical Sciences was told by Jackson R. Stalder and David Jukoff of the National Advisory Committee for Aeronautics. The reason is atmospheric friction.

At 75 miles altitude, they said, the heat of the sun has little effect as contrasted with its potency at customary flight levels. At altitudes of 150 miles, solar radiation is the predominating factor that determines the temperature of a body in flight. Within the earth's atmosphere friction alone melts meteorites that wander into it.

"At the extreme altitude encountered during flight of sounding rockets or missiles," they stated, "the atmosphere can no longer be considered as a continuous medium, and account must be taken of the motions of the molecules comprising the atmosphere." They submitted calculations of the temperatures of bodies travelling at altitudes from 75 to 150 miles, at speeds up to 13,000 miles per hour.

Wing Design for Speed

Power for supersonic flights has forced designers to consider relatively unconventional wings, most of them very thin, with a short span relative to their size, and a high degree of backward or forward sweep, the meeting was told by Victor I. Stevens, Jr., of the same government aviation laboratories.

The exhaustive study of wing shapes became urgent, he said, with the development of power plants capable of driving aircraft at supersonic speeds. Heretofore the primary limit on airplane speed was the available power. A wide range of wing designs were shown on charts, and their expected performance as determined by wind tunnel and other tests was indicated.

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VETERINARY MEDICINE

Vaccine Protects Poultry From Newcastle Disease

► A NEW vaccine to protect poultry against Newcastle disease, one of the most destructive of poultry maladies, has been developed by scientists at the Massachusetts Agricultural Experiment Station. It is prepared from a low-potency virus, and inoculated by the thrust of a small needle into the wing-web—the so-called "stick method."

Success with some 12,000 chicks is reported. Immunity was tested with a

potent virus from one to three months after vaccination, and all the young chickens survived.

It has been found possible to combine

TECHNOLOGY

New Type of Bed Proposed

► CONCRETE blocks will replace metal beds in hospitals of the future, if a French architect has his way. But the bed would feel no harder to the patient.

Jean Walter, a French hospital designer, explains his novel concrete bed in a report on hospital building in the journal, *Lancet*, (Jan. 3).

Patients would sleep on the usual mattress and springs. Instead of the metal frame support, the bed would be on a hollow concrete block covered with earthenware.

"This would save considerable trouble in cleaning," M. Walter points out.

Each block would have drawers for the patient's property and medical equipment, and the concrete bed could be wired for diagnostic instruments.

The new type of bed is only one of several suggestions the French architect has for modern hospitals. Hospitals, he believes, should be designed like industrial plants to prevent waste effort. And many hospitals use too much space.

The New York Hospital, built in 1930, has 576 cubic meters of space for each bed. M. Walter has designed hospitals with as little as 90 cubic meters per bed.

"I have discarded the dogma that all wards should face south," he declares.

Acute surgical patients average only 12 days in the hospital, while medical patients average 20. He argues that sunshine is not of great importance in this short time and that modern heating makes the sunlight unnecessary for warmth.

M. Walter's basic design for a large hospital consists of a central core, five to eight stories tall, with several wings extending out from the center. Through the central tower run elevators for patients, staff and visitors and other communication lines.

The wings on succeeding stories are graduated so that each floor has a balcony. This permits recuperating patients to get outside without using the elevator or leaving the building.

The top floor of the Frenchman's hospitals always is for the kitchen, so that the smell of cooking will not spread through the building.

And where is the architect's ideal

this vaccine with another, against fowl pox, and thus give the birds double protection with a single vaccination.

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medical center? M. Walter answers:

"It will be found that each center has something to offer: Munich has a model linen-room, Budapest the perfect kitchen, Alexandria (Egypt) the best infectious diseases department, and Chicago an excellent sound-proofing system."

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GENERAL SCIENCE

STS Honorable Mentions

Fifty-five girls and 205 boys will be recommended for scholarships as a result of their selection for honors in the Seventh Annual Science Talent Search.

► **HONORABLE** Mentions in the Seventh Annual Science Talent Search were announced by Watson Davis, director of Science Service. Of the 260 outstanding seniors in the list, 55 are girls and 205 are boys; the division was determined by the ratio of girls to boys who participated in the competition.

The 260 young people to whom Honorable Mention listing was given reside in 158 communities, located in 38 states and the District of Columbia. They were chosen from among 16,421 entrants, 3,161 of whom completed the science aptitude examination, submitted recommendations and scholarship records and wrote essays on "My Scientific Project."

Forty highest-ranking boys and girls have already been notified that they are winners of all-expense trips to Washington, where they will spend five days as participants in the Science Talent Institute, held in Washington Feb. 27 through March 2. At the closing session of the Institute, \$11,000 in Westinghouse Science Scholarships will be distributed, (See *SNL*, Jan 31).

All 300 selected for honors will be recommended as candidates for matriculation to scholarship-awarding colleges and universities.

In the six preceding Science Talent Searches, most of the students named in the Honorable Mention list have been offered scholarships, and many of those named this year will qualify for valuable scholarships and other financial aid in the colleges, universities and technical schools of their choice. The judges found all 300 winners to be students of outstanding ability.

Students in the Honorable Mentions list invariably rank high in their high school graduating classes: 37% of the boys and 33% of the girls stood first or second among their classmates. All have been interested in science for some years; 59% of the boys and 64% of the girls have studied some science in each of the four high-school years. A larger number have three years each of science: 90% of the boys and 98% of the girls.

The Honorable Mentions did not win their places merely by keeping their noses

in books; without exception they show records of participation in extracurricular activities. Science clubs have attracted many; 191 belong to such clubs, most of which are affiliated with the Science Clubs of America.

In Alabama one student received honorable mention; in Arizona, two;

ELECTRONICS

Recalls 400,000 Digits

► **A NEW** electronic calculator recently dedicated in New York combines the speed of electronic circuits with a "memory" capacity of 400,000 digits.

The latest brain child of the International Business Machines Corporation is equipped to utilize this speed and memory on the most complex problems of science. It combines for the first time electronic speed, vast memory capacity, and highly flexible and convenient programming facilities.

The over-all productive capacity of the Selective Sequence Electronic Calculator is reported to exceed that of any

Arkansas, one; California, 20; Colorado, three; Connecticut, one; Delaware, one; District of Columbia, one; Florida, two; Georgia, three; Idaho, five; Illinois, 11; Indiana, four; Iowa, one; Kansas, four; Kentucky, one; Maryland, five; Massachusetts, three; Michigan, four; Minnesota, four; Missouri, seven; Montana, one; Nebraska, one; New Hampshire, one; New Jersey, 15; New Mexico, one; New York, 97; Ohio, 18; Oklahoma, two; Oregon, one; Pennsylvania, 17; Rhode Island, one; Tennessee, three; Texas, three; Utah, one; Virginia, four; Washington, five; West Virginia, one and Wisconsin, four.

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other calculating machine in operation today. It can remember and recall automatically as required a total of nearly half a million digits.

Numbers that must be recalled most quickly are held in electronic circuits. The remainder are stored in relays and as holes in continuous cardstock tapes. By using punch cards as a supplementary medium of storage, the memory capacity is made almost limitless.

With this machine, located at the company's World Headquarters Building, 140,000 digits a minute can be read from punched tapes, 30,000 a minute



VAST MEMORY CAPACITY—This new electronic calculator can remember and recall automatically 400,000 digits. Its speed, memory capacity and flexible and convenient programming facilities will make it especially advantageous in the realm of science.

from punched cards. A total of 24,000 digits a minute can be recorded in printed form, 16,000 digits a minute can be noted as punched holes on cards.

The computing speeds of the latest IBM mechanical brain are as follows: It can add or subtract each second 3,500

numbers of 19 digits each; it can multiply each second 50 numbers of 14 digits each or divide 20 numbers of 14 digits.

The machine contains 12,500 electronic tubes, 21,400 relays and 40,000 pluggable connections.

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NUCLEAR PHYSICS

Is Test C To Be Secret?

► WILL "Test Charlie" be made a part of the top-secret atom-bomb experiments scheduled for the new mid-Pacific proving ground centered on Eniwetok atoll?

If this deep-water explosion, scheduled as part of the tests at Bikini but "postponed indefinitely," is restored to the program, it is highly improbable that the world will be told about it, as it was about tests A and B ("Able" and "Baker") in July of 1946. As a matter of permanent policy, all press and radio observers are excluded from the Eniwetok area.

It is possible, however, to form a reasonable conjecture of what such a test might be like, based partly on past experience, partly on present conditions and future possibilities.

Deep Water Test

Test C (or "Charlie") was originally planned to be held in deep water off Bikini, using such ships as were left after the first two tests, which were held within the lagoon. It was intended primarily to get a picture of the crushing effect on ships' hulls of an atom-bomb explosion in really deep water—a mile or more down. Since water is incompressible it was expected that this shock would be effective for a considerable distance; but existing physical and engineering tables do not suffice for a safe prediction of just what distance.

"Baker" test at Bikini was a submerged explosion, but a shallow one, for the depth of the lagoon at the center of the target array was only about 300 feet. All atoll lagoons are shallow, so if "Charlie" test is held in the Eniwetok area it will have to take place well out at sea—30 or 40 miles from the nearest island. If surface craft are tested, they will probably be held together with chains or cables. A practicable way to insure correct placing and depth of the bomb would be to suspend it on a mile or so of cable secured to one of the ships.

Value of a test against surface craft, however, would seem questionable at

present. The only surface navy of any size, outside of our own, is the British; and Britain, her great Continental rival gone and her overseas commitments much reduced, is now content to let supremacy rest with the U. S. Navy. In view of that fact, and of the additional fact that the survivor-ships at Bikini have all been taken either to Pearl Harbor or to the mainland Pacific coast, the expense and labor of setting up a target array of surface ships hardly seems worth while.

Naval tacticians might, however, want to try the weapon at depth against recent-type submarines. At the close of the war, Germany had developed a new U-boat design, said to be proof alike against radar detection and even the heaviest depth charges. It is rumored that the USSR has up to 300 of these craft, either taken over in the capture of German naval bases or completed since the war with the assistance of German technicians. Obviously, if the present "cold war" between the USA and the USSR should reach the shooting stage, these submarines would be the principal menace to our surface fleets and our merchant marine.

German Submarines Handy

We have a number of the late-type German submarines, as well as quantities of German plans and blueprints. A crushing test against such subs, with an atom-bomb as a super-depth-charge, might seem to be in order.

It would not be easy to arrange submerged U-boats for the test, but it probably could be managed. One of the biggest difficulties would be the salvaging of data from them if they were sunk in the test. A stove-in submarine would be highly interesting from a technical point of view, but on the bottom a couple of miles straight down would be rather inconvenient to board. It seems likely, therefore, that means would have to be devised to hold the damaged craft near the surface — possibly suspended from unsinkable floats — and perhaps haul

them up and put them into floating dry-docks after the explosion.

A test of this kind could probably be conducted in as nearly complete secrecy as is possible in this leaky world of ours. If surface ships of the Bikini target array should one day be missing from their berths, interested eyes might readily note their absence. But submarines are normally invisible and silent; they could proceed to the designated target spot under their own power and there be abandoned by their crews.

It is unlikely, too, that a mile-deep atom-bomb explosion would give news of its own occurrence. Probably no great amount of radioactive debris would reach the surface, and what the surrounding water would absorb would soon be so diffused in the vastness of the ocean that it would leave no trace.

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PHYSICS

Calculate Various Levels Of Temperature Above Earth

► IT'S 50 degrees hotter than boiling water 100 miles over your head. At 45 miles above the earth the temperature is 150 degrees Fahrenheit below zero. And it is the comfortable temperature of 70 degrees at 35-miles altitude, while in the atmospheric layer eight to 20 miles above the earth the average temperature is 75 degrees below zero.

One of the largest explosions in history, the destruction of Germany's Helgoland naval base with 5,000 tons of TNT on April 18 of last year, allowed Dr. Everett F. Cox of the Naval Ordnance Laboratory, Washington, to determine these temperatures. He announced them to the joint meeting of the American Physical Society and the Institute of Aeronautical Sciences, New York.

Noise from a great explosion does not reach distances of several hundred miles away until later than times calculated, assuming the sound travelled directly along the earth's surface. Around an explosion there are alternate zones of noise and silence.

Dr. Cox said that the best explanation of these skip-distances is that the sound waves travel upward until they hit a hotter layer of air high above the earth, where they are bent sufficiently to be reflected back to earth to form a noise ring. This sound is reflected by the earth and then goes up and down again to form another noise ring.

Using the observations of a special U. S. Navy expedition that observed the Helgoland blast at various points,

farthest of which was 620 miles away at Gorizia, Italy, Dr. Cox was able to calculate the temperatures at various altitudes. Sound at that distance had too low a frequency to be heard audibly.

The atmosphere 20 to 40 miles aloft is hotter than the air below because it has a larger amount of ozone, which absorbs the ultraviolet rays of the sun and heats the layer to a maximum of about 100 degrees Fahrenheit, depending upon the time of day, season and part of the earth. This ozone layer shields us from severe cases of sunburn.

A thin atmosphere layer 50 miles above the earth is colder than the ozone layer but still higher the temperature rises again. V-2 rocket flights made during the past year confirm the upper air temperature records.

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BOTANY

Seed of Metasequoias Will Be Planted in U. S.

► TREES from earth's earlier ages, supposed to have become extinct with the last of the dinosaurs, will soon be growing in American botanic gardens. Seed collected from survivors found in a hidden valley of central China have been brought to the Arnold Arboretum of Harvard University, and will be planted there and in nine other tree collections in this country, as well as two in England.

The tree, which is a fairly close relative of the redwoods or sequoias of California, has long been known from its fossil remains, for it had world-wide distribution millions of years ago. Metasequoia was the name given to it by botanists on the basis of these fossils. Now living metasequoias have been found.

The discovery was first announced about two years ago, by Chinese botanists who at first thought the tree was a peculiar kind of fir. As soon as identification of their specimens showed what a rare botanic treasure they had found, Prof. E. D. Merrill, long director of the Arnold Arboretum, arranged for an expedition to collect seed for planting in as many places as possible, to insure continued survival of the species.

According to the Chinese descriptions, metasequoia trees grow over 100 feet high and have trunks seven and one-half feet in diameter. Unlike the American sequoias, but like the American larch or tamarack and the swamp cypress, they shed their foliage in winter.

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MEDICINE

Drug Relieves Allergies

"Decapry," new antihistaminic agent, has completely relieved 80% of hay fever patients and over 85% of patients with hives. Unpredictable in bronchial asthma.

► A NEW histamine antagonist called "Decapry" has been developed which is a valuable addition to the antihistaminic or antiallergic agents now available for the management of allergic conditions. Dr. Fred W. Wittich, secretary-treasurer of the American College of Allergists, announced.

The new histamine antagonist was developed in the research laboratories of the Wm. S. Merrell Company, and its advantages and uses were reported by Dr. Ethan Allan Brown of Boston, Mass., and his colleagues (*Annals of Allergy*).

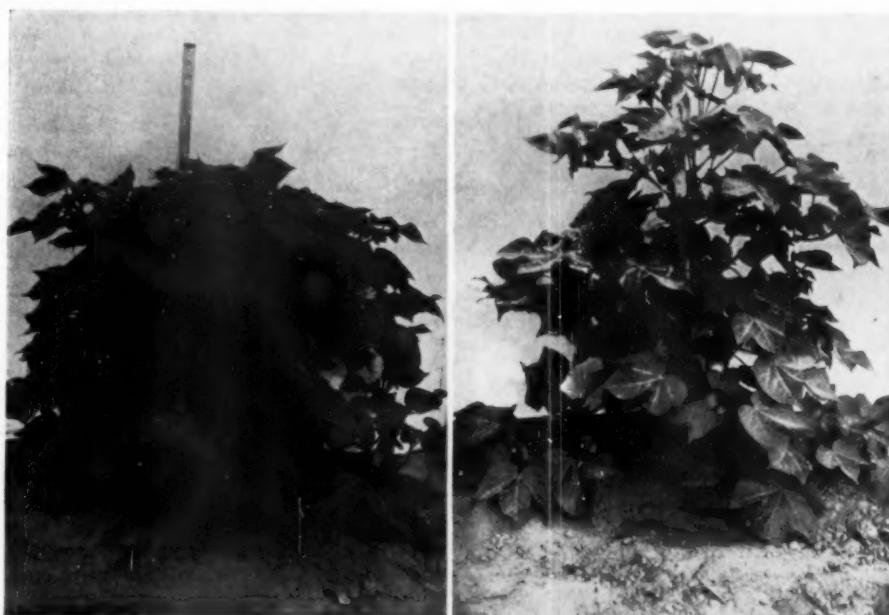
Approximately 80% of all allergic symptoms were relieved by Decapry. Analysis of results showed that 80% of patients with typical hay fever and over 85% of patients with urticaria or angioneurotic edema were completely relieved. In bronchial asthma, the effects, as with other antihistaminic drugs, are quite unpredictable. Of 54 patients, 30% were

markedly relieved, 40% were moderately relieved. In the remainder there was no noticeable relief, although in the group with associated nasal symptoms, a good number were relieved of these latter.

Drowsiness was the most common side action encountered. It was observed in about one patient out of six. Of the total number of 23 patients who reported disturbing side actions, 15 were in the asthma group, who received comparatively excessive dosage. Reactions in the remaining eight patients were moderate in five and severe in three. On the basis of a dose of 12.5 to 25 milligrams, used in treating patients other than the asthmatics, reactions occur much less frequently, probably in fewer than 10%.

Further studies on the effects of Decapry on cutaneous whealing response and other clinical evaluations are in progress and will be reported upon separately in the near future.

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RADIATION DWARFS COTTON—Hereditary changes are evident in the squat, compact plant on the left which grew from a seed which had been exposed to gamma radiation on the deck of a ship on "Able" day at Bikini. The plant on the right, grown from the same strain but from an unexposed seed, is less dense and taller. Plants from most treated seeds grown at the Texas Agricultural Experiment Station by Dr. Meta S. Brown, that sprouted at all, were nearly normal in appearance, but radical changes in the chromosomes in their cells were rather general.

Directions: Four possible answers are given for each question. Put an **X** in the answer box corresponding to the number of that answer which you think is **most nearly** correct.

1. A statement of equality between two ratios is known as a

() 1. fraction
() 2. quotient
() 3. percentage
() 4. proportion

2. This is a diagram of a spring similar to a hair spring in a watch. It is classified as a

() 1. compression spring
() 2. disk spring
() 3. leaf spring
() 4. torsion spring



3. Which of the following elements is chemically least like the other three?

() 1. argon
() 2. chlorine
() 3. krypton
() 4. neon

4. The gravitational attraction between two homogeneous spheres varies inversely as the square of the distance between

() 1. their centers
() 2. their farthest surfaces
() 3. their nearest surfaces
() 4. them and the ground

5. Which word belongs least with the other three?

() 1. calyx
() 2. corona
() 3. stamens
() 4. stigma

6. In a general sense, a process of transferring energy from a body across space is called

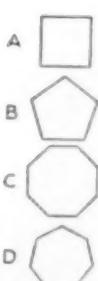
() 1. elasticity
() 2. magnetism
() 3. polarization
() 4. radiation

7. The gaseous envelope surrounding a celestial body is called

() 1. air
() 2. atmosphere
() 3. humidity
() 4. vapor

8. A is a square, B is a pentagon, and C is an octagon. D is a

() 1. decagon
() 2. heptagon
() 3. hexagon
() 4. nonagon



SECTION E: A $2\frac{1}{2}$ inch cube, as shown in the diagram, is made of half-inch cubes. Any one cube may be located in terms of a coordinate system. For example, cube *a* is in the fifth layer from the left, the fourth layer from the bottom, and the second from the front. It is, therefore, located in the position 5,4,2.

9. Which of the following is true?

() 1. $(3 \times 6) \left(\frac{1}{3}\right) = \left(\frac{3}{3}\right) \left(\frac{6}{3}\right)$
() 2. $\frac{10 - 4}{2} = 5 - 4$
() 3. $\frac{9 \times 4}{3 \times 2} \times \frac{4}{3} = \left(\frac{9}{3}\right) \left(\frac{4}{2}\right) \left(\frac{12}{9}\right)$
() 4. $\frac{(3)(3 \times 3)}{\frac{1}{2}} = 1 \times 3 \times 3$

PART A

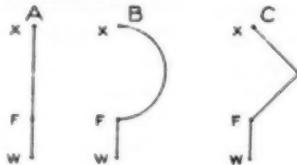
10. A village was considering a standpipe to produce pressure for its water supply. Four standpipes were considered with characteristics as shown below. Which would produce the greatest pressure at street level?

() 1. average height of water surface above the street 50 feet, diameter of standpipe 20 feet
() 2. average height 60 feet, diameter of standpipe 17 feet
() 3. average height 70 feet, diameter of standpipe 15 feet
() 4. average height 80 feet, diameter of standpipe 13½ feet

11. Which of the following terms has least in common with the other three?

() 1. fluorescence
() 2. incandescence
() 3. luminescence
() 4. phosphorescence

12. Disregarding friction, which of the arrangements of levers would give the greatest mechanical advantage? In each the force is applied at point *X*, and the fulcrum is indicated by *F*.



() 1. A
() 2. B
() 3. C
() 4. the same advantage for each

13. Which of the following pairs of things are most similar?

() 1. aero-embolism; bends
() 2. anoxia; anemia
() 3. DDT; 2,4D
() 4. hyperopia; presbyopia

14. All of the gears in the accompanying gear system have the same number of teeth. Each gear is in mesh with two other gears. Gear A turns counterclockwise.



Which of the following statements is correct?

() 1. Gears A and C turn in the same direction
() 2. Gears A and D turn in the same direction
() 3. Such a gear system cannot operate
() 4. Such a gear system would be useless

PART B

QUESTIONS SECTION

65. If the entries for *su* the largest which *cu* cubes?

() 1. cube
() 2. cube
() 3. cube
() 4. cube

66. The coordinates of the *co* cube shown in the diagram

() 1. 1, 1, 1
() 2. 1, 1, 2
() 3. 1, 2, 1
() 4. 2, 2, 2

67. What are coordinate *ha* have two points if a *si* were drilled in cube 2, *si* similar to hole in cube 5?

() 1. 1, 1, 1
() 2. 1, 1, 2
() 3. 1, 2, 1
() 4. 2, 2, 2

Below are a number of statements and some false ones. Each true statement is followed by a true statement. Each false statement is followed by a false statement.

() 101. A new law is a good law.

() 102. Cells in a plant are similar to cells in an animal.

() 103. Changes are not always due to average temperature.

() 104. Crabs very often tell the truth.

() 105. Hunting has been a means of feeding the people.

() 106. In a woman, menstruation means the end of life.

() 107. Malignant men are children.

() 108. The division of controls is a sign of intelligence.

() 109. The age of children is the same in all countries.

() 110. The life of man is shorter than that of a dog.

() 111. We should ask for more.

() 112. Many artificial dyes are made from chemistry, medicine, and physics.

() 113. Treatment of eye treatments are with measures and optical equipment.

() 114. Radar radioactivity is used to detect bombs in the atmosphere over the ocean.

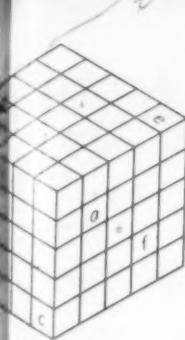
() 115. In a liquid, not all the particles are in motion.

() 116. A detector that goes out through a beam to make a beam.

() 117. The first sport to prove physical fitness.

() 118. The song was a round metered around 40,000 c.p.m. and was called by children.

SCIENCE APTITUDE TEST—This sample contains typical questions taken from the original three-hour examination given to high school seniors in the Seventh Annual Science Talent Search conducted by Science Clubs of America, administered by Science Service. The test was devised by Dr. Harold A. Edgerton, and Dr. Steuart Henderson Britt, psychologists of New York City. If you wish to take this test arrange to spend about 40 minutes of uninterrupted time. Then turn to page 92 for the answers.



SECTION E:

entire surface is painted blue, what is
the surface which can be built from the unpainted

1. 1 cube
2. 2 cubes
3. 3 cubes
4. 4 cubes

order the cube nearest the center of the
show diagram are

1. 1
2. 2
3. 3
4. 4

are coordinates of the cube which would
would if a hole $\frac{1}{2}$ of an inch in diameter
drill cube 2,4,1 through cube 2,4,5 and a
a hole cube 5,4,3 through 1,4,3?

1. 1
2. 2
3. 3
4. 4

a few statements, some of which are true
false. Each true statement with an X. Mark
statements.

A bow is a sign of will power.

Centuries in a person's hand foretell his future.

Children are distinctly above average in
intelligence and school grades more often than
not above average in height and weight.

Children very rarely above average in
intelligence.

Humans have to learn to fear snakes and
insects, the fear is not inborn.

In women have smaller brains than
men.

Mature men have been feeble-minded as
children.

They are divided into definite sections, each
of which controls some special ability or trait
such as intelligence, cheerfulness, etc.

The range of cousins is practically certain
to the children of interior intelligence.

The range of man's senses is limited to five.
We hear rapidly when awake than when
asleep.

Many artificial radioactive isotopes of
elements are useful for tracer experiments
in chemistry, physics, biochemistry, and
medicine.

Transmutation of gold into mercury by cyclotron
treatments has provided a new standard
of measurement in grinding lenses
and optical equipment.

Radioactive gas, generated by the
atomic bomb at Bikini, was detected in
the atmosphere over part of the midwestern
United States three days later.

Large quantities of liquid oxygen have been found
not to be the power of aircraft engines for
success.

A detector that shows invisible danger
out through use of infra-red rays has
been used to make night flying safer.

Treatment spores with mustard gas has
produced physiological varieties of a fungus

The songs of grasshoppers, measured
with a stethoscope, found to be at
frequency of 40,000 vibrations per second,
caused by children.

In an experiment, dry-ice fragments against
a cooler formed droplets in a laboratory
cooling system that fell like

SECTION I Suppose a number system were instituted
which had eight digits Δ , Λ , Z , ξ , \mathfrak{P} , \mathfrak{S} , \mathfrak{B} , and \mathfrak{T} corresponding respectively to the digits 0, 1, 2, 3, 4, 5, 6, and 7. The digit Δ is used in the same fashion as the 0 in the decimal system, e.g., $\Delta\Delta = 8$.

QUESTIONS ON SECTION I:

85. Which is equal to 8×8 ?
 () 1. $\Delta\Delta\Delta$
 () 2. $\Delta\Delta$
 () 3. $\Delta\Delta\Delta$
 () 4. $\Delta\Delta$

86. What is the sum of $\Delta + \Delta + \xi$?
 () 1. $\Delta\Delta$
 () 2. $\Delta\Delta$
 () 3. $\xi\Delta$
 () 4. $\Delta\Delta$

87. Which of the following indicates three-quarters of an
inch?
 () 1. $\frac{5}{\Delta\Delta}$ inches
 () 2. $\frac{\Delta}{\Delta\Delta}$ inches
 () 3. $\frac{\Delta}{\Delta\Delta}$ inches
 () 4. $\frac{\Delta\Delta}{\Delta\Delta}$ inches

88. What is the value of $\Delta Z \Delta - \Delta \xi + \frac{\Delta\Delta}{\Delta}$?
 () 1. $\Delta\Delta$
 () 2. $\Delta\Delta$
 () 3. $\Delta\Delta$
 () 4. $\Delta\Delta$

PART C

137. 1 meter equals 39.37 inches. Therefore, 1 square inch
equals how many square meters?

138. Logically, what word is represented by the symbol Δ in
the series: kiloliter, hectoliter, decaliter, liter, deciliter,
 Δ , milliliter.

139. What is the missing word in the following sentence?
"A figure is _____ with respect to a
straight line l if the points of the figure can be grouped
in pairs in such a way that the straight-line segment
joining any pair has l as a perpendicular bisector."

140. If the proposition "All X are Y" is universal and positive,
and if the proposition "Some X are Y" is particular and positive,
what two conclusions can be drawn about the proposition, "No X are Y"?

141. What is the error, and in which step or steps is it
made?
 (1) Let $x = a$
 (2) Then $x^2 = ax$
 (3) $x^2 - a^2 = ax - a^2$
 (4) $(x + a)(x - a) = a(x - a)$
 (5) $x + a = a$
 (6) Since $x = a$, we have
 (7) $a + a = a$
 (8) $2a = a$
 (9) $2 = 1$

GENERAL SCIENCE

Test Your Science Ability With Sample Problems

► HERE'S a test that you can try on
yourself or your friends. You may dis-
cover that you have the reasoning ability
that a scientist needs in order to tackle
and solve his investigational problems.

Thousands of high school seniors have
just taken the science aptitude test, of
which these questions are a part. They
were competing in the Seventh Annual
Science Talent Search for the Westing-
house Scholarships, and a tough super-
quiz was part of their entry.

The questions, now made public for
the first time, require the use of scientific
ability or aptitude. Not everyone has the
qualities that make a successful scientist,
just as not everyone can sing, paint or
learn languages easily. If you find the
test difficult, no matter! In any case, you
should get some idea of what it takes to
be a scientist. You may even discover that
you have abilities that you did not realize
you have.

Do you want to try the test? Then ar-
range to spend about 40 minutes of un-
interrupted time. All of the questions
should be finished in one sitting. When
you are through, turn to the answers on
page 92.

Now a few hints about taking the
test:

Don't expect to make a perfect score.
No one of the thousands of boys and girls
who have taken Science Talent Search
examinations has ever made a perfect
score. They are not expected to do so.
Neither are you.

You may start in on the test and then
not finish. Or you may take one look at
it and say: "That is too tough for me."
That is your privilege. No one is making
you take the test.

The high school seniors were not re-
quired to take the test. They could walk
out on it—and many of them did, thus
withdrawing from the competition.

The test is made quite difficult intentionally
in order to eliminate the persons
who do not have perseverance to finish a
job. This ability to finish what is started
is a prime requisite for solving scientific
problems, whether they be in atomic
energy, disease control, industrial tech-
nology or in everyday life. Sometimes
those who quit have reasoning ability,
but it isn't useful to them unless they
try to use it.

Doing well on this sample of the full
test (which takes three hours to do) is

(Turn to page 92)

ENGINEERING

Canals Retain Importance

Because they are inexpensive compared to other modes of transportation, they are still being used for freight that doesn't require faster transport.

By A. C. MONAHAN

► CANAL transportation is here to stay. Moving freight through canals may be slow but it is relatively cheap. A single mule can tow through water as heavy a load as a locomotive can pull on its steel track.

Most of the inland dug ditches will remain important routes for freight in spite of competition with railways, highways and airways. It is true that many early American canals were made obsolete by railroads relatively soon after railroading came into existence, but rails have not replaced many modern man-made waterways.

Shipping canals for ocean vessels are in another class. These permit ocean boats to travel far inland on rivers made navigable by dredging, or they are inter-ocean waterways such as the Panama and the Suez canals. These famous water routes may soon have competitors, but it will be friendly water competition made necessary by increased traffic and the possibilities of future wars. They are first objectives in any world war.

Rival Suez and Panama

Behind the reasons advanced for a rival Suez and rival Panama are increased transportation needs, political necessity and possible warfare. These greatest and most important of all shipping canals are located in regions foreign to the countries that use them most. This creates a special situation.

Another canal through the neck of land that connects the two Americas, either in Colombia or Nicaragua, is possible and feasible both from engineering and economic standpoints. A canal from the Mediterranean to the Red Sea by way of Palestine is reported proposed by British engineers. It is wanted before the Suez passes to the control of Egypt.

A canal from the Nile to the Red Sea would provide a second route to the Suez but it would be in Egypt. It could follow the route where a canal was built as early as 1380 B. C., according to ancient historians. There is not much evidence to support the claim, but it is known there were several canals from

the Nile to the Red Sea in early Christian centuries.

The Amr is the best known of these. Amr was the Arab conqueror of Egypt in the 7th century. The Amr canal was open at various times but closed for long periods in its history. Part of it is now used to carry fresh water from the Nile to the city of Suez on the Red Sea.

Use of Man-Made Canals

The use of man-made canals in other continents also dates back many centuries. The Grand Canal of China is one of those most important historically. It was constructed in the 13th century, for transportation and irrigation, and connects the Pei-Ho and Yangtse-Kiang rivers.

Charlemagne (742-814) is said to have proposed a canal to connect the Rhine with the Danube by way of the Main river and the now-American-occupied part of Germany. The present canal, which provides a waterway from the

North Sea to the Black Sea, was begun by Germany in 1921.

Western Europe for many years has been criss-crossed with thousands of miles of barge canals, and probably half the freight in Germany and France in prewar days moved by water. European canals felt the competition of railroads far less than those in early America. About one-half the former 5,000 miles of inland canals in this country are now closed because of railways. Included among the closed water routes is the first canal constructed in this country. It was at South Hadley, Mass., and was dug in 1792-96.

America's great interest in internal waterways has been in making rivers navigable, even for long distances inland from the ocean. Some 24,000 miles of United States rivers have already been canalized by straightening, deepening and providing with locks. There will be more later.

The Panama and the Suez are unique among the world's shipping canals because of their positions and their strategical value in war times. They provide the former missing links in the short round-the-world water route. Their greatest value since construction has



INTEROCEAN TRAVEL—Man-made waterways permit ocean vessels such as the U. S. S. Boxer, shown here, to be towed through the Panama Canal for interocean transportation.



CANAL MODEL—Modern technology requires laboratory studies with models such as the relief of the Cape Cod Canal, shown in this picture, which Massachusetts Institute of Technology engineers built to observe the effects of rising and falling tides.

been commercial, but their war value has been recently emphasized.

How important they are is evidenced by the part the Suez played in both world wars. It will be remembered that during World War II, when Russia was desperately in need of American supplies to stem the Nazi invasion of the Soviet Union, American vessels were forced to round the coast of South Africa to reach the Persian Gulf. It will be remembered also that the Panama Canal was an important objective of the Japs, which fortunately they never reached.

Suez Internationally Managed

The Suez, formally opened to traffic in 1869, is under international management of a board composed of French, English and Dutch representatives. In theory, it is always "open, in time of war as in time of peace, to every vessel of commerce or of war, without distinction of flag." The concession granted by Egypt for the canal expires in 1968. Certain British statesmen now feel that a new canal, not crossing Egypt, should be built and ready for use before that date.

One proposal, that has been made public in London, is a canal across Palestine near its southern border. It would extend from Gaza on the Mediterranean to the upper end of the Gulf of

Aqaba (Akaba), an arm of the Red Sea with a northern extremity touching both Palestine and Trans-Jordan. It would be 40% to 50% longer than the 100-mile Suez, and probably would have locks where it would cross highlands in eastern Palestine.

The war value of two separated canals to connect the Mediterranean and the Red Sea is self-evident. For peace-time purposes, the value is not as evident, but it must be remembered that the greatest oil fields yet discovered are in Asia Minor in the general area adjoining the Gulf of Persia. The development of these fields means greatly increased Mediterranean traffic. The oil mined can be piped to Mediterranean ports, but the supplies and equipment needed in the oil fields and by their thousands of employees must reach them by boat to ports on the Persian gulf.

Panama Canal Is Vulnerable

The Panama canal has served its purpose well since opened in 1914, but it will soon be unable to meet growing commercial demands. It is not wide enough for some of the new vessels, and it is vulnerable to enemy destruction, particularly from airborne bombs. When built, aerial bombing was practically unknown, and the atomic bomb was un-

dreamed of, except perhaps in the minds of a few advanced scientists.

One proposal is to widen, deepen and straighten the present canal, building new locks with greater width. A second is to replace it with a sealevel canal, following in part only the present route. A third is to open an entirely new canal, neither in the Canal Zone nor in Panama, to provide a waterway for the largest ships and to lessen danger from enemy attack.

The present canal, which cost in the neighborhood of \$500,000,000, has triple locks near each end to raise or lower vessels some 85 feet to or from the main section of the route across the high land of the isthmus. It is these locks that are vulnerable to enemy bombs; one well-placed bomb could put the canal out of use for three to five years.

The proposed sealevel canal would be lockless except for one low construction to handle the approximately one-foot different tide elevations of the two oceans. The canal would be from 200 to 750 feet wide, and its bottom would be 65 feet below sealevel. Its cost would be perhaps five times that of the present canal, but it would probably cost less to maintain. Without locks travel through it would require much less time.

Several sites outside of Panama have been suggested for the building of a new canal. One is in northern Colombia not far from the Panama border. Another is the Nicaraguan route, where it was first planned to build the original inter-oceanic waterway. It is still available. An America option, acquired in 1916 for \$3,000,000, is still in force.

Nicaraguan officials have recently offered America full cooperation in building a shipping canal through their country. They promise also the necessary bases to defend it.

Science News Letter, February 7, 1948

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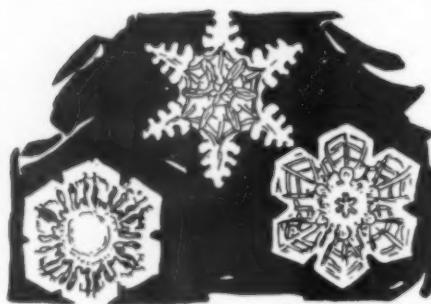
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GEOLOGY

NATURE RAMBLINGS

by Frank Thone



Eskimos and Wheat

► SNOW is the friend of migratory Eskimos in the long Arctic winter, just as it is of the rooted wheat in this more favored land. When a little band of Eskimos decide to make camp, they quickly build a perfectly domed igloo out of blocks of packed snow. When there is a thick cover of snow over the wheat-fields, farmers stop worrying about the crop.

The same physical property of snow benefits both frigid-zone men and temperate-zone plants, though not in exactly the same way. The structure of snow crystals, as spiky six-pointed stars, insures that massed snow on the ground shall be highly porous and fluffy, with a great deal of trapped air. This makes snow a good thermal insulator, for exactly the same reason that such things as rock wool, felt and cork are good insulators. As a matter of fact, up to the temperature where it partly melts and then re-freezes into solid ice, snow is a better insulator, weight for weight, than most commercial products used for that purpose.

Not that it is warm under the snow. It cannot be, else the snow would melt. But it is less cold than it is in the outer air, and the wind does not reach the living creatures within its shelter. The latter point is of especial importance in the case of the wheat, for it is probable that plants suffer even more from drying out than from freezing when they are naked to the winter weather. Another important benefit of snow-insulation for the plants it covers is its prevention of too-rapid changes in temperature, either up or down, which can harm plants in a number of different ways.

The snow-sheltered Eskimos do warm up the inside of the igloo to some extent, partly with their blubber-fed stone lamps, partly with animal heat from their own robust bodies. They even keep themselves warm when lying on the snow sleeping-bench, by inserting a layer of a different kind of insulator—furs. But they must not make the interior so hot that the snow walls begin to melt, then re-freeze; for ice, unlike snow, is a rather good conductor of heat. You ruin the igloo if you make it too warm inside.

Exactly this has been happening, among Eskimos who have obtained kerosene stoves from white traders. After the excessive warmth has changed the igloo from a snow house into an ice house, it loses much of its value as a shelter, and the inhabitants are liable to contract tuberculosis and other lung ailments. Since the trade in stoves cannot be stopped, missionaries in the Arctic now try to persuade the Eskimos to use their summer skin tents as linings for their igloos, thereby preserving the insulating value of the snow blocks.

Science News Letter, February 7, 1948

From Page 89

creditable, but it does not mean that you can quit what you are doing and become a scientist. To be a professional scientist requires many years of study and preparation as well as native ability. But there are many situations in your daily work and life that require the same kinds of ability that scientists need.

The science aptitude test is only one of the techniques used in selecting boys and girls who are scientifically gifted. In addition each contestant filled out a personal data blank and wrote an essay describing some scientific project he has done or wishes to do. Teachers filled out

a recommendation form and principals reported scholarship. All these are used in choosing winners.

Taking the test and competing in the search comes as a culmination of high school science study and science club activity for thousands of boys and girls of America's public, private and parochial secondary schools.

Don't read further. Cover up the following paragraph until you have taken the test.

The correct answers to Part A are: 1, 4; 2, 4; 3, 2; 4, 1; 5, 2; 6, 4; 7, 2; 8, 2; 9, 3; 10, 4; 11, 2; 12, 4; 13, 1; and 14, 2. Right answers for Part B are 65, 2; 66, 3; and 67, 2. 85, 1; 86, 2; 87, 2; 88, 3.

Your true and false answers should read: 101, 0; 102, 0; 103, X; 104, 0; 105, X; 106, X; 107, 0; 108, 0; 109, 0; 110, 0; 111, X; 112, X; 113, X; 114, X; 115, 0; 116, X; 117, X; 118, 0; 119, X.

On the last questions, you may take credit if your answer was in different words, but be sure it means the same as the correct ones. They are: 137. One over 39.37 squared; 138. Centiliter or .01 liters; 139. Symmetric or symmetrical; 140. Universal and negative; 141. Both sides were divided by zero in going from step four to step five, which results in an indeterminate form.

Your score is the number of questions you answered correctly. If you only answered 20 or less correctly, you probably are not gifted in science. But if you scored 33 or more, then you may have a real talent for science. Average aptitude is indicated by scores ranging from 21 to 32 inclusive.

Now, let's go back over the answers and see which questions you answered correctly. You should have been right on 1, 3, 7, 8, 101, 102, 105 and 112. Those are rated as the easiest ones.

Which ones did you puzzle over most? The hardest questions are 13, 85, 88, 103, 106, 108, 110, 113, 137 and 140.

Science News Letter, February 7, 1948

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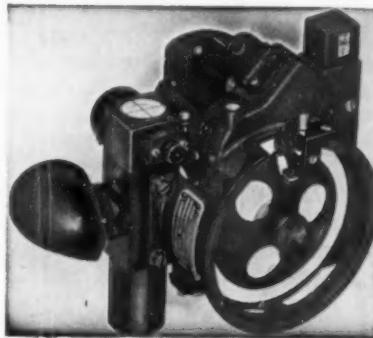
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Mead, a fermented honey beverage popular in Europe during the Middle Ages, is to be produced again in England, following an old recipe.

A new cadmium-mercury lamp is designed to simplify the problem of lighting color movie sets while decreasing stifling studio heat.

India exported during October, 1947, over 372,000 pieces of lizard, crocodile, snake, lynx and marmot skins for leather and other uses; about 80% of them came to America.

Certain poisons applied to the soil where a house is to be built may prove protection against a later termite invasion; scientific investigations are under way to determine whether the method can be used.

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Books of the Week

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ALEXANDER DALLAS BACHE: Scientist and Educator, 1806-1867—Merle M. Odgers—*Univ. of Pa. Press*, 223 p., \$2.75. The biography of a great-grandson of Benjamin Franklin who, like his illustrious forebear, was closely associated with scientific institutions. Notable contribution of Bache was in building up the Coast and Geodetic Survey.

THE ALPHA-KETO ACIDS — Kenneth L. Waters—*Mellon Institute*, 14 p., paper, free from publisher—Pittsburgh 13, Pa. Excellent bibliography.

ANATOMY AND PHYSIOLOGY LABORATORY MANUAL AND STUDY GUIDE — Barry Griffith King and Helen Maria Roser—*Saunders*, 3rd ed., 267 p., illus., \$3.00. Includes paper-bound Instructors' Supplement at no additional charge.

BIBLIOGRAPHY AND INDEX OF GEOLOGY EXCLUSIVE OF NORTH AMERICA — Vol. II, 1945-1946—Marie Siegrist and Eleanor Tatge—*Geological Society of America*, 474 p., \$3.25.

BLUE CROSS AND MEDICAL SERVICE PLANS — Louis S. Reed—*U. S. Public Health Service*, 323 p., illus., paper, free from Public Inquiries Section, U. S. Public Health Service, Washington 25, D. C.

THE CASE BOOK OF A MEDICAL PSYCHOLOGIST — Charles Berg—*Norton*, 260 p., \$3.50. Twenty-five case studies from the practice of a British psychiatrist.

CATALOGUE OF TYPE SPECIMENS OF FISHES IN CHICAGO NATURAL HISTORY MUSEUM — Marion Grey—*Chicago Natural History Museum, Fieldiana: Zoology*, Vol. 32, No. 3, 96 p., paper, illus., \$1.25.

CAUSES OF CATASTROPHE — Earthquakes, Volcanoes, Tidal Waves, and Hurricanes—L. Don Leet—*Whittlesey House*, 232 p., illus., \$3.00. A seismologist gives the layman an understanding of those tremendous happenings of nature.

CONSERVATION IN AMERICA — Mary I. Curtis—*Lyons & Carnahan*, 118 p., illus., \$1.00. A beautifully illustrated book in large type for children telling a story that is extremely important to their elders as well.

DISCOVERING OUR WORLD — Book 3—Wilbur L. Beauchamp, Mary Melrose Williams and Glenn O. Blough—*Scott, Foresman*, 304 p., illus., \$1.64. One of the Basic Studies in Science. Gorgeously illustrated in color this book answers the common questions of children about science. It is intended for Grade 6.

DOCTOR FREUD: An Analysis and a Warning — Emil Ludwig—*Hillman, Williams*, 317 p., \$3.00. A well-known biographer sees in Freud's teachings a peril as typically American as Wagner's was German. This is a specially adapted American edition of a work originally written in German.

EXPERIMENTAL AIR-BORNE INFECTION — Theodor Rosebury—*Williams and Wilkins*, 222 p., illus., \$4.00. Report of a wartime study of primary interest to those concerned with the prevention of epidemics or with bacteriological warfare. First volume of Microbiological Monographs.

FACTORS IN BOTANICAL PUBLICATION AND OTHER ESSAYS — Neil E. Steven—*Chronica Botanica*, Vol. II, No. 3, 87 p., paper, \$2.00.

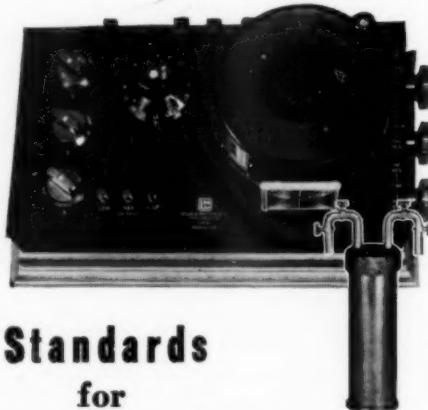
FREE FILMS: 16 mm Silent and Sound—Lili Heimers—*N. J. State Teachers College*, 40 p., paper, \$1.00.

FUN WITH YOUR CAMERA: Practical Chats on Amateur Camera Activity—Jacob Deschin—*Whittlesey*, 264 p., illus., \$3.00. A book for camera enthusiasts covering not only picture taking but darkroom procedures and the winning of contests.

HEARING AIDS AND AUDIOMETERS — Report of the Committee on Electro-Acoustics—*British Information Service, Medical Research Council Special Report Series No. 261*, 71 p., paper, illus., 45 cents.

A HISTORICAL APPRAISAL OF MECHANICS — Harvey F. Girvin—*Int. Textbook*, 275 p., \$3.25. A well written treatise for students and workers in technology, focusing attention upon the importance of the history of mechanics in engineering education.

HOW TO MAKE AND USE A SMALL CHEMICAL LABORATORY — Raymond Francis Yates—*Norman W. Henley*, 140 p., illus., paper, \$1.00. A new and revised edition.



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HOW WELL CAN MANAGEMENT PREDICT? An Examination of Prognostic Research, Its Utility and Limitations—William A. Hamor—*Mellon Institute*, 6 p., paper, free from publisher: Pittsburgh 13, Pa.

LIFE: Its Nature and Origin—Jerome Alexander—*Reinhold*, 291 p., illus., \$5.00. Life, the author believes, is dominated by catalysis—catalysts not only dominating the chemical changes essential to life, but constituting ultimate living units. Many fields of science are involved in the discussion.

MEDICINE TODAY: The March of Medicine, 1946—*Columbia Univ. Press*, 177 p., \$2.00. No. XI of the New York Academy of Medicine Lectures to the Laity. They cover a variety of subjects having to do with medical economics, education and research.

MODERN COSMETICOLOGY—Ralph G. Harry—*Chemical Pub. Co.*, 3d ed. rev., 515 p., illus., \$12.00. A technical book.

THE NATIONAL RESEARCH COUNCIL REVIEW FOR 1946—*National Research Council, Canada*, No. 1641, 146 p., paper, 75 cents.

NEW METHOD FOR TESTING CATALYSTS—J. A. Hinckley, Jr. and Harry R. Shepard, Jr.—*Mellon Institute*, 3 p., paper, illus., free from publisher: Pittsburgh 13, Pa.

1000 AMERICANS—George Seldes—*Boni & Gaer*, 312 p., \$3.00. The editor of the newsletter "In Fact" writes about "Big Powers, Big Magazines, Big Business and Big Reaction" which he feels control the economy of this country.

OUR STATE BIRDS—Mary I. Curtis—*Lyons & Carnahan*, 122 p., illus., \$1.20. A book for children, nicely illustrated with drawings and colored plates.

POPULAR MECHANICS FARM MANUAL—Editors, Popular Mechanics—*Popular Mechanics Press*, 284 p., illus., \$3.00. A collection of how-to-do-it articles of special interest to the farmer profusely illustrated with photographs and diagrams.

THE REHABILITATION OF SPEECH—Robert West, Lou Kennedy and Anna Carr—*Harper*, rev. ed., 650 p., illus., \$5.00. A book for students and professional workers in the field of speech pathology and voice disorder.

REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION AND FINANCIAL REPORT OF THE EXECUTIVE COMMITTEE OF THE BOARD OF REGENTS FOR THE YEAR ENDED JUNE 30, 1947—*Govt. Printing Office*, 169 p., paper, 75 cents.

THE SECOND REPORT OF THE UNITED NATIONS ATOMIC ENERGY COMMISSION TO THE SECURITY COUNCIL, Sept. 11, 1947—*Govt. Printing, Dept. of State* Publication 2932, 106 p., paper, 30 cents.

SOME NOTES ON THE PSYCHOLOGY OF PIERRE JANET—Elton Mayo—*Harvard University Press*, 132 p., \$2.50. Discussion of those aspects of the work of Janet believed to be of special interest to students of industrial and social psychology.

SURVIVAL IN THE AIR AGE—*Govt. Printing Office*, 166 p., paper, 75 cents. A report by the President's Air Policy Commission.

SYSTEM FOR RAPID EVALUATION OF CATALYSTS FOR PRODUCTION OF BUTADIENE FROM ETHANOL—M. H. Whitlock, G. J. Haddad, and E. E. Stahly—

Mellon Institute, 4 p., illus., paper, free from publisher: Pittsburgh 13, Pa.

TERTIARY NAUTILOIDS OF THE AMERICAS—A. K. Miller—*Geological Society of America, Memoir* 23, 234 p., illus., \$4.50. A handsomely illustrated technical report.

TEXTBOOK OF EMBRYOLOGY—Harvey Ernest Jordan and James Ernest Kindred—*Appleton-Century*, 5th ed., 613 p., illus., \$7.50. For medical and premedical students.

TEXTILE BRAND NAMES DICTIONARY—*Textile Book Pub.* 1st ed., 377 p., illus., \$6.00.

THOMAS JEFFERSON AMONG THE ARTS—An Essay in Early American Esthetics—Eleanor Davidson Berman—*Philosophical Library*, 305 p., illus., \$3.75. New light on the life of a man who was scientist as well as artist and statesman.

ASTRONOMY-RADIO

Meteors Tell of Upper Air

► "SHOOTING STARS," those pinheads of stone or iron that frequently flash across the sky, are helping radio experts learn more about the upper atmosphere.

The heat generated by meteors racing through the rarefied air at a rate of 40 miles or so per second is sufficient to vaporize the smaller meteors so that they burn themselves out. But along the path they traveled is left a trail of hot ionized gases. What you see in the heavens is this trail of hot gases rather than the meteor itself.

These gases and others perhaps not so bright adjacent to the path the meteor followed 60 to 200 miles above the earth are highly ionized. Meteors travel with such high velocities that they are capable of producing ion trails tens of miles long and possibly even a half mile in diameter, Dr. A. G. McNish of the Central Radio Propagation Laboratory, National Bureau of Standards, told members of the Philosophical Society of Washington.

Instead of letting radio waves go through to the normal reflecting layer in the upper atmosphere, these ionized meteor trails reflect back to the earth radio waves of low frequency, letting high-frequency waves slip through. These reflected waves appear as large "pips" on the radar scope.

These reflections have been observed on radar sets using frequencies of 100 megacycles or lower, but are never picked up on frequencies as high as 3,000 megacycles. Observations were made at the Bureau's radio station at Sterling, Va., under the direction of V. C. Pineo.

The temporary ionization produced by the impact of meteors on the upper

THE UNITED STATES AND RUSSIA—Vera Micheles Dean—*Harvard University Press*, 321 p., \$3.00. A thoughtful appraisal leading up to the answer to today's difficult question, is war inevitable? The author suggests possible means of averting it.

THE WEB OF GOVERNMENT—R. M. MacIver—*Macmillan*, 498 p., \$4.50. A Scotch-born sociologist, now professor of political sociology at Columbia University, writes on the philosophy of government.

WHAT TO MAKE FOR CHILDREN—*Popular Mechanics*, 110 p., illus., \$2.00. A variety of ways for the hobbyist-father to keep busy building furniture and playthings.

WORLD GEOGRAPHY—E. L. Thurston and E. H. Faigle—*Iroquois Pub. Co.*, rev. and enlarged ed., 359 p., illus., \$2.88. A postwar geography for grades seven and eight.

Science News Letter, February 7, 1948

atmosphere gives a good opportunity for studying how electrons that have been knocked out of atoms recombine. It helps scientists understand how the ionosphere propagates radio waves.

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• **PORTABLE TYPEWRITER**, which weighs only 8.5 pounds and is about three inches high when in use, is British-built, writes a nine-inch line in pica characters, and can be used to make five or six carbon copies. It has a standard keyboard and takes full-length half-inch wide ribbon.

Science News Letter, February 7, 1948

• **CARBURETOR** for liquid petroleum gas controls the proportion of air as well as gas intake from closed to full open position. The control of both eliminates the risk of dilution by liquid gasoline and carbon formation in the engine, it is claimed.

Science News Letter, February 7, 1948

• **LECTURE CAR**, Union Pacific Railroad, is a windowless motion picture theater seating 52 persons, for instructional meetings of railway employees and also for farmers' meetings. The movie screen can be raised and lowered by remote control from the projection booth at the rear.

Science News Letter, February 7, 1948

• **KEY CASE** holds two keys either of which can be ejected as shown in the picture by pushing one of the metal side buttons down a notch in the case. It holds the ejected key firmly for use



until it is snapped back into the housing by releasing the spring-actuated button.

Science News Letter, February 7, 1948

• **PHONOGRAPH RECORDS** for children are on light disks of especially processed paper covered with a plastic coating. It is said to be an excellent material for a sound surface, and as durable as the standard type of shellac records. Records include treasure tales and musical tales for youngsters.

Science News Letter, February 7, 1948

• **LIGHTING FIXTURES** for Navy fighting ships are made of plastic-glass and aluminum and will remain uninjured under severe shock from guns, shell and bomb explosions and other disturbances. They are also fire-resistant, and are made for either fluorescent or incandescent lamps.

Science News Letter, February 7, 1948

• **ROTATING ELECTRIC** machine kit is designed to make easy the job of teaching all types of electric motors. With it some 132 different types of operating machines can be built, and all parts and coils are visible at all times. The accompanying manual gives instructions for building the various types.

Science News Letter, February 7, 1948

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Question Box

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How do "shooting stars" help radio experts learn more about the upper atmosphere? p. 95.

ELECTRONICS

What are the outstanding features of the new electronic calculator? p. 85.

What new method has been discovered to control the flow and amplification of an electric current? p. 82.

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Why do canals still retain their importance? p. 90.

GENERAL SCIENCE

What is the history behind the new drive for federal support of science? p. 82.

MEDICINE

What are the advantages and uses of a new drug for allergies? p. 87.

NUCLEAR PHYSICS

How have new types of electrical "semiconductors" been produced? p. 88.

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TECHNOLOGY

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VETERINARY MEDICINE

What new protection is there for poultry against Newcastle disease? p. 84.

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